DIRECTIONS

177129 Issue 3

2436 SERIES
REFLECTING TYPE GALVANOMETERS

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2436 SERIES

REFLECTING TYPE GALVANOMETERS

1. GENERAL DESCRIPTION

These galvanometers are complete assemblies but they require a compartment, in a measuring instrument or a separate box, in which they can be mounted for use. Each galvanometer assembly consists of three major sub-assemblies as described below. All number references are to Fig. 1.

First, the galvanometer proper (includes the galvanometer coil, suspensions, magnet, and mirror) contained in steel tube 21. Second, the reflecting system (includes lamp 15 and focusing tube 19 in housing 10, and the three mirrors 7, 9, and 22) mounted on support bracket 8. Lucite rod pilot light 26 and 26A is part of this assembly. Third, the mounting plate 4 to which the galvanometer system and reflecting system are attached and in which scale 6 is mounted.

This complete assembly is mounted in the measuring instrument case or in the separate box by means of the four screws A. When mounted in the instrument case, terminals 24, of the galvanometer, and terminals 12, for the lamp supply, make contact with their respective spring contacts; 30 and 31 for the galvanometer and two at 13 for the lamp supply. The spring contacts for the galvanometer are connected to terminals 23 which in turn are connected to the proper points in the circuit of the measuring instrument. The spring contacts at 13 are connected to a 3-volt supply for lamp 15. This supply may come from batteries or an a-c supply in the measuring instrument or from similar sources outside the measuring instrument but brought in through the measuring instrument case.

The cutout and dimensions for mounting the complete assembly in the measuring instrument or in the separate box are shown in Fig. 2. The box depth of 5-1/2" is the nominal depth of the box used by L&N. One method of supporting the spring contacts 13, Fig. 1, is by means of a U-shaped bracket 37, Fig. 2, fastened to the bottom of the box as shown in Figs. 1 and 2. The height of bracket 37 will be determined by the depth of the instrument case or box in which the assembly is mounted.

The mounting arrangement of the contacts for the galvanometer is shown in Fig. 1.

A spare lamp is mounted in clip 11 on the lamp housing.

The electrical characteristics are listed in Table I.

2. OPERATION

See that all connections to the measuring instrument are completed. De-energize the measuring circuit but allow all other connections to remain as for making a measurement. See that lamp 15 is energized. When the lamp is lit, the red lucite rod pilot 26A will glow.

Unclamp the galvanometer coil by turning thumbscrew 1 about 3-1/2 turns counterclockwise.

Under these conditions, the image from the galvanometer should appear on scale 6 as a lighted square, with the index line bisecting the lighted square

TABLE I—ELECTRICAL CHARACTERISTICS OF GALVANOMETERS

CAT. NO.	SENSITIVITY (microamperes/ scale div.)	PERIOD (seconds)	RESISTANCE (Ohms)	
			EXTERNAL CRITICAL DAMPING	SYSTEM
2436-a	0.1	4.0	35	35
2436-b	0.06	3.0	100	40
2436-c	0.025	3.0	1,000	90
2436-d	0.010	3.5	10,000	500

and parallel to the lines on the scale.

If the index does not come to rest at zero on the scale, adjust the zero as indicated in Section 3.

If the index line is not parallel to the lines on the scale, adjust this position as indicated in Section 4.

If the image of the scale is not in focus, adjust for proper focus as indicated in Section 5.

If no image appears on the scale, check the reflecting system as indicated in Section 8.

The galvanometer is now ready for use. Energize the measuring circuit and proceed with measurements.

3. ADJUST GALVANOMETER ZERO

This adjustment should be made with the battery or source of current disconnected from the measuring circuit but with the measuring circuit connected to the galvanometer for damping purposes. Cap 1 is the coarse zero adjuster while the FINE ADJUST knob permits a vernier adjustment of the zero setting.

Turn the FINE ADJUST knob to the limit of travel in each direction and note the position of the knob at each limit. Then turn this knob to a point approximately mid-way between the limits. Now turn cap 1 to have the index line, of the image, come to rest as close as possible to zero on the scale. Use the FINE ADJUST knob to bring it to rest at zero.

4. ADJUST POSITION OF INDEX LINE ON SCALE

Remove the four screws A from the top plate of the galvanometer and lift out this plate with the complete galvanometer system attached. Use the small Allen wrench, received with the galvanometer, and loosen screw 18 just enough to permit tube 19 to be rotated by hand. Tube 19 contains the index.

Connect temporary jumpers between lamp terminals 12 and spring contacts 13, for the lamp supply, to energize the lamp. Some other three-volt power supply may be used to energize the lamp if desired. Then rotate tube 19 until the index line is parallel to the lines on the scale and tighten screw 18 to hold this adjustment.

Disconnect the temporary supply to the lamp and replace the galvanometer assembly in the instrument.

5. ADJUST FOCUS OF IMAGE ON SCALE

Proceed the same as indicated in Section 4 except, slide tube 19 forward

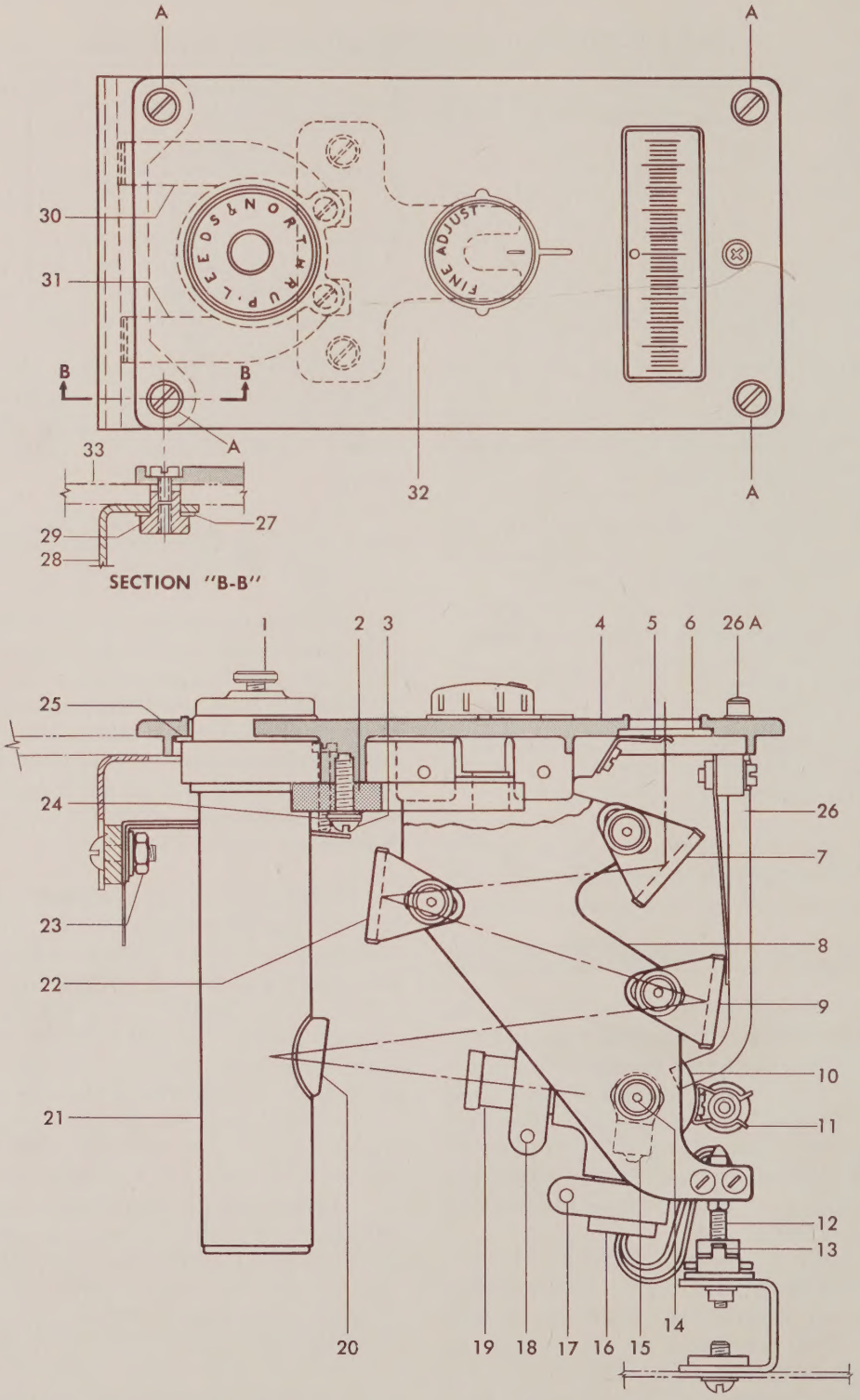
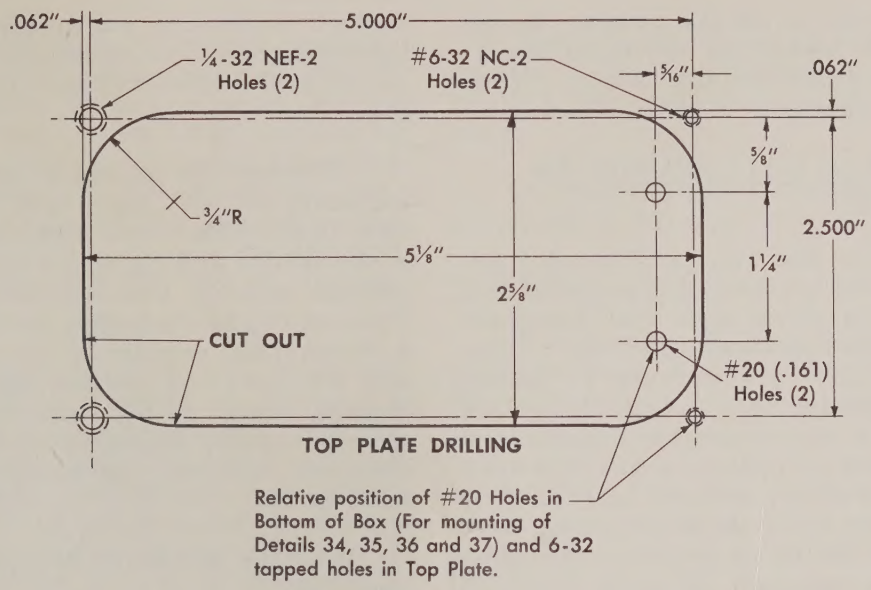


Fig. 1—2436 Galvanometer, top and internal view.



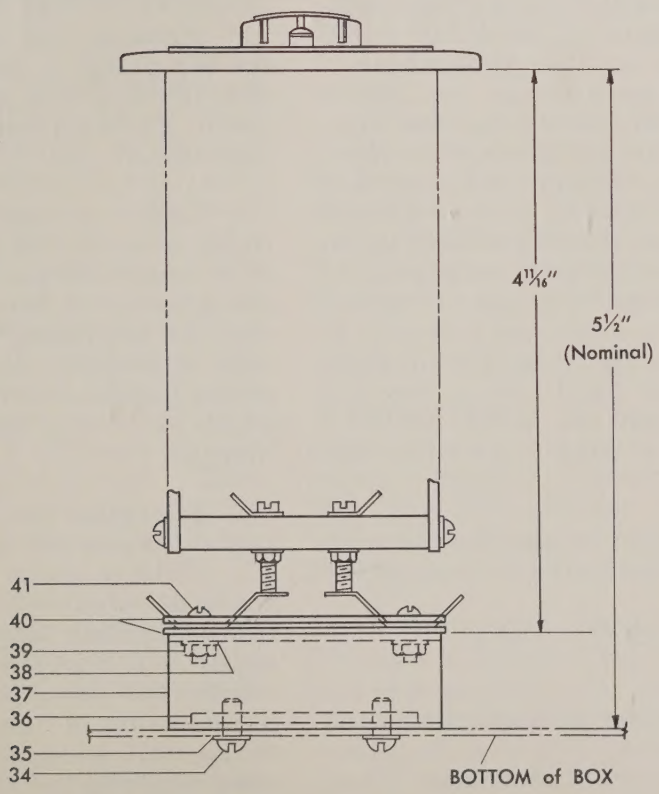


Fig. 2—2436 Galvanometer, mounting dimensions.

or backward to obtain proper focus. Be sure the index line remains parallel to the lines on the scale. Then tighten screw 18.

6. REPLACE GALVANOMETER SYSTEM

Remove the four screws A from the top plate of the galvanometer and lift out this plate with the complete galvanometer system attached. Then remove the two screws 3, noting the arrangement of washers on the screws, as they must be replaced in the same sequence for the new galvanometer system, and lift the galvanometer system, along with yoke 2, from the assembly. Remove the two screws which secure yoke 2 to the galvanometer and remove this yoke.

Mount yoke 2 on the new galvanometer system. Turn the FINE ADJUST knob so that it is approximately mid-way between the limits of travel. Then mount the new subassembly on the top plate with cap 1 extending up through the plate and with the arms of yoke 2 fitted around the shaft of the FINE ADJUST knob. Replace screws 3, and washers, to hold the system in place. Tighten these screws a sufficient amount to prevent the galvanometer system from tilting but back them out far enough to permit the FINE ADJUST knob to move yoke 2 easily and smoothly.

If necessary, adjust the reflecting system as indicated in Section 8.

7. REPLACE LAMP

Remove the four screws A from the top plate of the galvanometer and lift out this plate with the complete galvanometer system attached. Then use the small Allen wrench, received with the galvanometer, and loosen screw 17 to enable lamp socket 16 to slide down and out of the housing.

Remove the socket with the lamp. Remove the old lamp and insert the new one. Insert the lamp and socket in the holder and tighten screw 17 just enough to hold the socket in place. Then energize the lamp, by connecting a three-volt supply to terminals 12, and adjust the socket until the U-shaped image of the lamp filament is approximately centered on the galvanometer mirror, as seen through window 20.

Tighten screw 17 to hold this adjustment.

8. ADJUST REFLECTING SYSTEM FOR PROPER IMAGE

Remove the four screws A from the top plate of the galvanometer and lift out this plate with the complete galvanometer system attached.

Check to see that window 20 is lined up with focusing tube 19. If this condition does not exist, adjust the position of the galvanometer system as indicated in Section 6. Connect a jumper across terminals 24 of the galvanometer for damping purposes during the following adjustments.

Energize the lamp by connecting a three-volt supply to terminals 12. Hold a piece of white paper in front of window 20. An image of the lamp filament should appear on the paper. If no light beam appears, either the three-volt source is dead or the lamp is burned out. Check the three-volt source. If this is "live", then replace the lamp as indicated in Section 7. Then check to see that the

image of the lamp filament appears on the mirror inside window 20. If this condition does not exist, loosen screw 17 and adjust lamp socket 16 until a distinct image is obtained and tighten screw 17. To adjust the vertical position of the image in the mirror, loosen screws 14 and tilt the lamp housing 10. Then tighten screws 14.

Tilt mirrors 7, 9, and 22 to approximately the positions shown in Fig. 1. To tilt the mirrors, use the small Allen wrench, received with the galvanometer, and loosen the screws at either end of the mounting brackets just enough to move the mirrors easily and see that the screws in the ends of the brackets are approximately in the center of the slots. In any case, see that the ends of a given mirror are adjusted the same, to prevent twisting of the mirror.

Hold a piece of white paper in front of mirror 9. The image from the galvanometer should appear on the paper. If necessary, tilt lamp housing a slight amount. Then hold the paper in front of mirror 22. The image from the galvanometer should appear on the paper and should strike mirror 22 equidistant from the top and bottom edges. If necessary, tilt mirror 9 a slight amount. The image from the galvanometer should now appear on scale 6. If necessary, tilt mirror 7 to obtain this result. Then carefully tighten the screws in the ends of the three mirrors to hold the adjustments.

If the index line of the image on the scale in not parallel to the lines on the scale, make the adjustment as indicated in Section 4.

If the image on the scale is not in proper focus, adjust as indicated in Section 5.

Remove the jumper from terminals 24 of the galvanometer and replace the assembly in the instrument.

Adjust the galvanometer zero as indicated in Section 3.

9. REPLACE SCALE

Retainer 5, Fig. 1, holds the scale in place. Remove the two screws from this retainer and remove the retainer and scale. Replace the scale and retainer in the reverse order, being sure that the markings on the scale face down into the instrument case and that the zero (0) is toward the FINE ADJUST knob.

10. MAINTENANCE

10A. Cleaning Focusing Tube Lens, Mirrors, or Galvanometer Window

These items can be cleaned with a soft cloth dampened with water. In extreme cases a mild soap solution should be used. When dry, wipe lens and mirrors with silicone impregnated lens paper to inhibit the adherence of dust on these surfaces.

10B. Cleaning Scale

CAUTION: Do not use water in cleaning the scale as the scale markings are soluble in water. Use a photographic film cleaner, such as listed below, or equivalent organic solvents.

Photographic Film Cleaner — Phillips & Jacobs Co., Phila., Pa.

Chlorothene Solvent -

Trichlorethylene -

Carbon Tetrachloride -

REPLACEMENT PARTS

Description	L&N® Part No.
Galvanometer system for:	
2436-a	062101
2436-b	062102
2436-c	062103
2436-d	062104
Lamp (G.E. Mazda #13)	Std. 3038-1
Lamp socket (with leads)	040258
Scale	058403
Plane mirror (without bracket)	051033
Yoke to hold galvanometer in place	160003
Retainer for scale	027188
Allen wrench	See Note 1
Screws for galvanometer holding yoke	5/8" 6-32 R.H.B., CR.P
Spring contact for galvanometer terminal (30, Fig. 1)	029622
Spring contact for galvanometer terminal (31, Fig. 1)	029623
Condensing lens (used in focusing tube)	050085
Window of galvanometer	Std. 2101-A
Index (used in focusing tube)	048064
Spring contact for lamp terminals	029624
Lucite rod, pilot light	026085

Note 1 - Standard commercial 5/64" Allen wrench.

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